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NEWS LETTER

FOR FEBRUARY 1936

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ANDREW N. CAUDELL

Andrew N. Caudell, entomologist on the Insect Identification staff and honorary custodian of Orthoptera at the National Museum, died at his home in Washington, D. C., on March 1, after an illness of 3 weeks following a stroke of paralysis. Mr. Caudell was born in Indianapolis, Ind., on August 18, 1872, and as a boy moved to Oklahoma with his family. In 1897 he graduated from Oklahoma State College. The following year he came to Washington to take a position with the Bureau of Entomology and was continuously employed in the Bureau from that date until the time of his death. Nearly all his efforts in entomology were in the taxonomy of the Orthoptera, to which he had contributed numerous papers and in which field he had become widely known as an authority. His wife, Nellie Cundiff Caudell, a daughter, Mrs. Elmer R. Shade, of Brooklyn, N. Y., and a sister, Mrs. Allie Cripe, of Tulsa, Okla., survive him.

SCREW WORM CONTROL WORK TO BE HANDLED AS A DIVISION

Effective March 15, 1936, the cooperative educational control work on screw worm will be handled as a Division with W. E. Dove in charge. The headquarters for the work will be in the field. Mr. Dove was in field charge of the work done last season under the direction of the Division of Insects Affecting Man and Animals. During the period of his new assignment he will be relieved of all the research he has been doing on sandflies and related pests and will devote his full attention to cooperative control work on screw worms. The Agricultural Bill now being considered by Congress will, if approved, provide funds for the continuation of the cooperative educational control work on screw worm in the Southeast and will extend the activities to the Southwest. This change permits placing maximum emphasis on research on insects affecting man and animals, including that done on screw worms. It will enable the leader of the Division of Insects Affecting Man and Animals to give research activities merited and undivided attention.

FRUIT INSECT INVESTIGATIONS

Laboratories closed.--The laboratory at Albany, Ga., for the mass production of the Trichogramma egg parasite for utilization in field tests for the control of certain pecan insects and the codling moth, was closed on February 29. Herbert Spencer, who was in charge of the work at this laboratory, will devote his full time to the leadership of the Orlando, Fla., laboratory. The sublaboratory at Orleans, Ind., for field tests of lights and baits to control the codling moth, was closed effective March 15. D. W. Hamilton is being transferred to work on the codling moth in the Hudson River Valley, N. Y., and S. A. Summerland will join the staff at the Vincennes, Ind., laboratory. The laboratory at Moorestown, N. J., for the field testing of baits to control the oriental fruit moth, was closed, effective March 12. W. P. Yetters, Jr., who has been in charge of that laboratory, has been assigned to the work on parasites of the oriental fruit moth.

Injury to cultivated crops by Japanese beetle larvae.--I. M. Hawley and T. N. Dobbins, of the Moorestown, N. J., laboratory, in summarizing the work of the year 1935 on this project, report on larval surveys made in 17 fields in southwestern New Jersey during the period August 20 to October 28, 1935. The larval population averaged 13.4 per square foot in asparagus fields, 12.6 in alfalfa, 6.7 in corn, 4.6 in peppers, 5.1 in potatoes, 4.6 in tomatoes, 9.1 in pumpkins, and 17.8 in pastures. The numbers of larvae present in fields planted to the same crop varied widely. Three pastures gave averages of 9.4, 15.2, and 21.6 per square foot; three asparagus fields, 26.0, 10.9, and 2.6; three corn fields, 8.7, 4.6, and 5.8; two tomato fields, 4.7 and 4.4; two pepper fields, 5.3 and 3.9; and two alfalfa fields, 10.4 and 13.9.

Control of adult Japanese beetle in rose greenhouses.--F. W. Metzger, Moorestown, reports that the first beetle of the 1935-36 winter season emerged from the greenhouse plots on February 4, as compared with emergence on December 27 in 1934. This difference in time of initial emergence is attributed to the severe winter, with the temperature at a lower level throughout the period than during the 1934-35 season. The total emergence to date has been light, but is steadily increasing. It is probable that the peak of the emergence will be considerably later than in the past two seasons.

Protection of truck crops from injury by Japanese beetle larvae.--F. E. Baker, Moorestown, reports on tests involving the growing of 30 different kinds of vegetables in soil treated with various concentrations of paradichlorobenzene after the soil had remained fallow for 30 days. The vegetable seeds were planted directly in the treated soil 30 days after treatment. The purpose of the test was to determine whether, after 30 days in the soil, a sufficient amount of the chemical had dissipated from the soil to eliminate, or at least to decrease, the detrimental effects to germination and growth noted when the seeds were planted on the day of treatment. The germination of the various vegetable seeds--asparagus, lima bean, string bean, beets, broccoli, brussels sprouts, cabbage, carrots, cauliflower, celery, pop corn, sweet corn, cucumbers, eggplant, endive, kohlrabi, lettuce, muskmelons, okra, onion, parsley, parsnip, peas, hot peppers, sweet peppers, radishes, spinach, tomatoes, turnips, and watermelon--planted in sassafras sandy loam 30 days after treatment with paradichlorobenzene at concentrations of 100, 200, 400, and 600 pounds per acre has been summarized. Radishes showed a significant decrease in germination in soil that had been treated with paradichlorobenzene at the rate of 400 pounds per acre; celery and sweet corn showed decreases in soil treated with 600 pounds per acre; and the other 27 varieties of vegetables apparently germinated normally.

Studies with Japanese beetle parasite.--In summarizing the laboratory propagation work with *Tiphia vernalis* Roh. during the past year, T. R. Gardner, Moorestown, has found that the mortality among parasitized grubs that died before development of the parasite was twice as great as among the nonparasitized grubs used as a check. The data obtained are as follows: Series held in temperature-controlled cellar, parasitized, grub mortality 43.6 percent; check, unparasitized, 22.1 percent mortality; series held in insectary, parasitized, grub mortality 51.5 percent; check, unparasitized, 29.9 percent mortality. All grubs originated in the same field, were dug at the same time, and were stored under the same temperature and humidity conditions. The grubs used in parasitization work were taken out of the storage chamber and handled approximately 4 times in 24 hours, during which time they were stung and oviposited upon by the female parasite and were then placed in the rearing cross-section trays. The grubs used in the check were taken out of the cellar at the same time and transferred immediately to the cross-section trays.

Fixation or removal of lead arsenate in soil.--The application of lead arsenate at the rate of 1,500 pounds per acre has been one of the most effective methods for destroying Japanese beetle larvae in large blocks of nursery stock in the field. However, when the necessity for growing the stock in larvae-free soil has passed, or when the nurseryman desires to grow plants susceptible to arsenic in the treated plots, or when conditions arise where the presence of large quantities of lead arsenate in the soil is not desirable, some methods for fixing the lead arsenate in an inert form in the surface layers or of eliminating it from the soil should be available. In cooperation with the New Jersey Agricultural Experiment Station, an investigation has been undertaken to determine methods for fixing lead arsenate in the soil in a form not injurious to plants. The investigation will consider immediately the following phases of the problem: (a) The normal vertical movement of lead and arsenic in different types of soil used for growing nursery stock in New Jersey; (b) identification of the different insoluble arsenic compounds formed in the soil; (c) determination of the effect of adding different materials on the fixation of lead and arsenic; (d) determination of the reaction of arsenic-susceptible plants in soil containing lead arsenate, to which various materials have been added for the purpose of fixing the insecticide. The headquarters for the project will be at the Japanese Beetle Laboratory at Moorestown, and the work will be carried on by W. E. Fleming and C. W. Mell.

MEXICAN FRUIT FLY CONTROL

Activities in lower Rio Grande Valley.--Although the shipping season for Texas citrus fruits does not end until March 31, it is estimated there remained in the area on February 29 only about three hundred cars for shipment. Several packing plants have closed entirely and many others are operating on part time. More adult *Anastrepha ludens* Loew were trapped in February than in any month this season. There was an increase from 49 for January to 83 for February. Of this number, 58 were trapped during the first half of the month. Inspections for larval infestations have been intensified throughout the month. Although many adults have been trapped in citrus groves, no larval infestations were found in February.

DATE SCALE CONTROL

Reed Garden still free from scale.--In February the Reed Date Garden in the Imperial Valley was inspected and no scale was found. The last scale found on the project was found in this garden in February, 1934. Inspection was continued in the Imperial Valley in the infested area and leaf-base work was also continued. In the Coachella Valley scouting for unlisted volunteer palms was continued.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Derris dust kills western spotted cucumber beetle at low temperatures.--L. P. Rockwood, Forest Grove, Oreg., reports that on January 13, beetles that had assembled on fence posts when creek bottom lands were completely flooded were dusted with a mixture of derris root and "Red Dog" flour made up to a strength of about 1 percent rotenone. Care was taken to hit with the dust all beetles seen. Owing to the irregular distribution of the beetles, which ranged in numbers from 3 to more than 100 per post, no accurate checks could be made. The mean temperature for the 3 days following the dusting was 43.5° F., with a maximum of 50° and a minimum of 38°, and there were light rains, totaling 0.77 inch. The posts were examined on January 20, when the water had not entirely receded, and very few living beetles were found on or near them. On undusted posts the numbers of beetles were about the same as on January 13. Dead *Diabrotica soror* Lec. and dead weevils of *Hypera punctata* Fab. were found at the bases of the dusted posts. On January 29, 20 *D. soror* beetles, collected on January 20, were shaken up in a paper carton with a pinch of the derris-Red Dog dust and were then placed, with green vetch for food, in a clean carton. This carton was kept at unheated room temperatures--below 50° in the daytime and 40° or below at night. Within 24 hours all but 3 of these beetles had died. The survivors were unable to stand but could move some of their appendages when taken into a warm room, and the last of them died within 48 hours. None of the 100 undusted beetles in similar cartons died during this period.

Tolerance of field corn to European corn borer.--L. H. Patch and G. T. Bottger, of the Toledo, Ohio, laboratory, report as follows: "The rate of reduction in the bushel yield per acre per borer per plant of open-pollinated strains of corn has been compared with that of hybrid strains on 10 plantings during the last 5 years. In the absence of borers the mean yield of the open-pollinated strains was estimated to be 75.0 bushels per acre. For each additional borer per plant the yield was reduced 2.71 bushels. If the hybrid strains had yielded 75.0 bushels per acre in the absence of borers each additional borer per plant would have caused an estimated reduction of 1.65 bushels per acre. From this comparison, it may be observed that the damage by the borer was greatest on the open-pollinated strains, the yield being reduced about 1 bushel per acre more per borer per plant on them than on the hybrids. Hybrid strains are more vigorous in growth than common strains, which probably accounts for the greater tolerance of the hybrids as a group to corn-borer attack. The rate of reduction in the bushel yield per acre per borer per plant of single-cross hybrid Ill. A X Ind. Tr has been compared with that of other hybrid strains of corn on 8 plantings during the last 4 years. In the absence of borers the mean yield of A X Tr was estimated to be 107.4 bushels per acre. For each additional borer per plant the yield was reduced 2.21 bushels. For the same mean yield in the absence of borers of other hybrids as a group each additional borer per plant caused a reduction of 3.52 bushels per acre. Therefore it appears that single cross A X Tr is more tolerant to the corn borer than other hybrid strains as a group, the yield being reduced about 1.3 bushels per acre less per borer per plant on it than on other hybrids of equal yielding capacity. All of these comparisons are highly significant statistically."

Sweet-corn resistance to European corn borer.--Morris Schlosberg and Ralph Mathes, Toledo, report as follows: "Research on sweet-corn resistance to the European corn borer was inaugurated in 1935 as a cooperative project by the Bureau of Entomology and Plant Quarantine and the Bureau of Plant Industry. Tests were conducted near Toledo with sweet-corn strains received from the State experiment stations of Iowa, Minnesota, Illinois, Indiana, Michigan, and Connecticut. Analyses of the results obtained from multiple tests with 90 inbred and hybrid strains of sweet corn showed no differences between strain results with regard to egg deposition and larval survival which directly could be attributed to inherent resistance, although significant differences were shown among the strains. A wide range in strain results was obtained, but analysis of variance indicated that the major part of the differences was due to random variation in the experiment. Where significant differences occurred between strain results they appeared to be associated with differences of relative seasonal development of the strains during exposure to infestation, such as plant height, presence or absence of tassel, and degree of plant development, rather than to inherent resistant properties in the strains. However, the data of a single season's tests provide inadequate basis for definite conclusions. In connection with the above, the place of resistance should be clearly defined in regard to borer control. The term resistance should be applied to borer control where the control is influenced by inherent properties in a strain when the strain is favorably exposed to infestation. Resistance to the European corn borer may be shown by a strain in three phases: (1) Repellence to oviposition or borer attack; (2) inhibition of borer development; and (3) tolerance to borer injury. A strain may be resistant in one phase and highly susceptible in another. From a practical standpoint, therefore, the final measurement of resistance should be based on the reduction of damage when a strain is favorably exposed to borer infestation."

FOREST INSECT INVESTIGATIONS

Ips oregoni Eich. has long period of fall emergence.--L. G. Baumhofer, of the Fort Collins, Colo., laboratory, reports that data obtained from the caging of ponderosa pine thinning slash in the Black Hills show an emergence period of 73 days for I. oregoni. Slash cut on August 2, and infested a week or 10 days later, was placed in cages on September 25. Adult beetles, probably including some of the original parent adults, were leaving the slash on the date of caging and emergence continued until December 6. Heaviest emergence occurred during the last week in October, just prior to a week of cold, freezing weather. Subsequent emergence, comprising about 16 percent of the beetles, occurred on warm days. Total emergence averaged 113 adults per square foot of bark surface. Last spring it was found that a large percentage of the adults had wintered in the litter and duff. Although none were observed in this situation in September and October, it seems likely that, had further observations been possible, beetles could have been found in November, following the peak of emergence.

Emergence of the Black Hills beetle in southeastern Wyoming.--In analyzing the data obtained from cages placed on the lower boles of limber and lodgepole pine attacked by the Black Hills beetle on Elk Mountain in southeastern Wyoming, J. M. Whiteside, of the Fort Collins laboratory, reports the following points concerning the seasonal history of this beetle: (1) Emergence at 8,000 feet elevation started about August 1, 1935, and extended over a period of 47 days; at 9,000 feet emergence began on August 7 and lasted 40 days; and at 10,000 feet it started on August 15 and lasted 56 days. (2) After the beginning of emergence, the same number of days were required for the final 10 percent of the total emergence as were required for the first 90 percent. (3) Total emergence from limber pine averaged 164.5 beetles per square foot and was 804 percent greater than the average of 18.2 beetles from lodgepole pine.

Development of the European spruce sawfly under laboratory conditions.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports: "At intervals throughout the month spruce sawflies emerged from cocoons collected at various places in New England and New York. They were placed in cellophane bags on branches of young spruce trees. These bags proved to be more satisfactory than the wire cages, used earlier in the winter, which covered the entire tree. More eggs were laid in the cellophane bags, possibly because there was more light and the sawflies were more active. The eggs hatched in from 6 to 7 days and at the end of the month the larvae were in the early part of the second instar. One female emerged on February 8 from a cocoon spun up in the laboratory on January 7, from an egg laid in the laboratory on December 7. The remaining 9 cocoons of this series are still under observation. The generation completed development at the Connecticut Agricultural Experiment Station, under controlled temperature and humidity conditions, in 38 days. The much longer period required for our cocoons is caused by lower temperature and humidity conditions, particularly the latter. The larval period (from hatching of the egg to spinning of the cocoon) was almost the same length as that at the Connecticut Agricultural Experiment Station. A new series of cocoons will be placed in a controlled room for a further check on the relation of temperature and humidity."

Oviposition preferences of bark insects.--R. R. Whitten and W. C. Baker, of the Morristown, N. J., laboratory, have tabulated data obtained from elm logs and felled elm trees exposed to insect attack in the field during 1935. They state that when an entire tree was felled in the open, the smaller elm bark beetle (Scolytus multistriatus Marsh.) appeared to prefer the sides of the trunk for oviposition and the native elm bark beetle (Hylurgopinus rufipes (Eich.)) appeared to prefer the lower surface. The upper surface remained uninfested. Such results did not follow when the felled trees were shaded. The elm bark weevil (Magdalis sp.) apparently prefers the smaller limbs of elm, although its larvae were found in wood up to 9 inches in diameter. Of the small logs, this weevil preferred those suspended in trees, rather than those placed in a horizontal or vertical position on the ground. Except in the case of the elm bark weevil, there was no correlation between the diameter of the wood and the degree of insect attack. Of the cerambycid and buprestid larvae found in the material, approximately 95 percent were those of the common elm borer (Saperda tridemtata Oliv.).

PLANT DISEASE CONTROL

Barberry eradication.--Expansion of field work in connection with barberry eradication was begun on March 1. At the close of the first week in March more than 1,200 men were employed. On March 1, approximately 38 percent of the W. P. A. funds allotted for barberry eradication had been used; 1,300,000 hours of employment had been provided men eligible for employment under the Emergency Act; and between 28,000 and 29,000 square miles of area had been covered by survey crews. Records show that 17,000,000 barberry bushes have been destroyed on 3,300 properties. It is expected that by April 15 our full quota of men will again be in the field and that during the next 6 months an average of about 3,000 men will be continuously employed. During the period January 5 to 8, E. C. Stakman, in charge of rust surveys, assisted by Wallace Butler, made observations concerning the overwintering of stem rust in Oklahoma, Texas, and Illinois. Mr. Stakman reports as follows: "No stem rust was found in the vicinity of Tulsa, Okla., on either wheat or oats, although leaf rust was fairly abundant on both. Near Purcell, Okla., some stem rust was found on oats, and in a field south of Fort Worth oat-stem rust was observed." According to Mr. Stakman, the conditions for overwintering of stem rust in northern Texas have been much less favorable this year than last. In February there were 14 days of alternate freezing and thawing on 4 of which the temperature remained below freezing throughout the 24 hours. No stem rust was found in Illinois.

Accomplishments in blister rust control in 1935.--The following table shows by regions the approximate results of blister rust control work carried on under all programs--Regular-Cooperative, E. C. W., P. W. A., and W. P. A.--during the calendar year 1935.

Region	Area worked	Ribes bushes destroyed	Labor
	Acres	Number	Man-days
Northeastern----------	1,099,237	27,401,596	370,824
Southern Appalachian-	1,130,317	3,868,523	32,820
North Central--------	444,330	37,959,396	172,374
Western---------------	363,192	67,627,540	285,358
Total-----------	3,037,076	136,857,055	861,376

COTTON INSECT INVESTIGATIONS

Field population of pink bollworm in Mexico.--Examinations were made by C. S. Rude at Tlahualilo, Durango, Mexico, to determine the field population in six fields where cotton was grown in 1935. In two of the fields the stalks were cut, raked, and burned early in November and the land was later flooded. In those fields an average of 0.83 larvae per square yard was found alive. In three of the fields where the stalks had been cut, raked, and burned in November but where the land was not flooded, an average of 1.92 live larvae per square yard were found. In one field where the stalks had not been cut and no clean-up of any kind practiced, an average of 149.3 larvae per square yard were found. Of these, 139.3 were on the stalks and soil surface and 10 were in the soil. This field consisted of 260 acres, with an estimated population of nearly 188 million larvae, or 722,619 per acre.

Winter mortality of pink bollworms in surface trash.--A. J. Chapman and associates at Presidio, Tex., report that the mortality of pink bollworms in surface trash in old cotton fields between December 24, 1935, and March 1, 1936, was over 65 percent. The mortality among the hibernating larvae will probably be higher than that before any of these insects reach maturity and before there is cotton available on which they may oviposit in May and June. The mortality during the next 2 or 3 months will probably be increased by the plowing, irrigation, and cultivation of the fields. On December 24, after the cotton fields had been cleaned up, the surface trash from 50 square yards was collected for examination, taking it from 25 square yards each at two representative points in a field. A thorough examination of the locks, small bolls, old blooms, leaf trash, and other material in this surface trash gave an average of 12.58 larvae per square yard on December 24. A similar examination of trash collected on March 1 showed only 4.38 larvae per square yard. These two examinations indicate a mortality of 65.18 percent during this period of less than 10 weeks in midwinter.

Plowing and irrigation increase winter mortality of pink bollworm.--Mr. Chapman and H. S. Cavitt, studying the relation of cultural practices to the pink bollworm, report over 85 percent mortality of the worms following plowing and irrigation in January. From 15 square yards of surface soil collected immediately after the cotton was picked, there were obtained averages of from 94 to 113 pink bollworms per square yard (averages of from 82 to 86 worms in locks and trash on the surface and from 12 to 27 in the soil). On February 20, after these fields had been plowed and irrigated in January, an examination of 15 square yards of surface soil showed averages of only 12.8 to 13.8 worms per square yard, the percentage of mortality ranging from 85.77 to 88.69 in the three areas from which collections were made. The mortality will undoubtedly be greater before the new cotton crop is available for the moths.

Orchard burner for pink bollworm control.--Tests by D. A. Isler, of the Bureau of Agricultural Engineering, assigned to the Presidio laboratory, indicate that a field burner appears promising in controlling pink bollworm larvae in surface trash. The apparatus tested was a small, manually propelled orchard burner of the generator type. Samples of the surface trash before and after burning showed a reduction of from 87.8 to 98.6 percent of the worms, depending on the rate of speed.

Pink bollworm in Puerto Rico.--L. C. Fife reports that, owing to drought, most of the cotton on the southern coast of Puerto Rico had opened by the end of February and was only lightly infested by pink bollworms. A few fields of the old crop still standing on the northern coast contained green bolls, which were 45 percent infested. Many fields in this section were planted in February for the 1936 crop, which will be harvested from August to October.

Pink bollworm parasites.--L. W. Noble and W. T. Hunt, of the Presidio laboratory, report that adults of the European corn borer strain of Exeristes roborator Fab. emerged during the latter part of January and throughout February from pink bollworm infested material collected from fields where liberations of this parasite were made last season. No E. roborator emerged from cornstalks infested with the southwestern corn borer. The Egyptian pink bollworm strain of E. roborator began emerging at about the same time from larvae reared in the laboratory on pink bollworms in cotton locks. The Hawaiian strain of Microbracon mellitor Say began emerging in hibernation cages on February 6 and continued throughout the month. As yet no Chelonus blackburni Cameron has emerged from cotton bolls collected in fields where liberations were made last year.

Cotton flea hopper emergence.--K. P. Ewing and R. L. McGarr report that the first flea hoppers observed in the vicinity of Port Lavaca, Tex., this season were several first- and second-instar nymphs found on small croton plants on March 5. The first nymphs emerged in the hibernation cages on March 6. The emergence this year is about 3 weeks later than usual, owing to the cold winter, and this is the first time during the 4 years the cages have been run that no emergence occurred in February. H. J. Reinhard reports that the first emergence in hibernation cages at College Station, Tex., was also on March 6. T. P. Cassidy, of Tucson, Ariz., reports that flea hopper nymphs were taken abundantly in sweepings of Sphaeralcea in the Salt River Valley on March 11. No adults were present and emergence had recently begun.

Relation of Hemiptera to cotton boll rot.--T. P. Cassidy and L. D. Christenson report that during the summer of 1935 an examination of 18,700 cotton bolls from 33 fields in Arizona showed that 1.3 percent were rotted. The fungi responsible for rotted bolls were *Rhizopus nigricans* and *Aspergillus niger* (identified by R. B. Streets of the University of Arizona) and unidentified pathogens responsible for internal boll rot. Tests were made to determine the relationship of boll-puncturing insects to these boll diseases. Twenty percent of bolls confined with *Euschistus impictiventris* Stal developed boll rot, and 30.8 percent of the bolls confined with *Chlorochroa sayi* Stal developed boll rot. Tests with the cotton stainer *Dysdercus mimulus* Hussey have all resulted negatively, as did 146 check bolls sheltered from insect injuries. Internal boll rot occurred naturally only inside of insect-punctured bolls. Whether insects transport the boll-rotting organisms or merely provide wounds through which the rotting organisms infect has not been determined.

Effect of manurial control of root rot of cotton on soil-animal fauna.--L. D. Christenson has summarized this phase of his season's work at Buckeye, Ariz., as follows: "At the Bureau of Plant Industry station at Sacaton, Ariz., control of phymatotrichum root rot of cotton has been brought about by application of green and barnyard manures. During 1935 in cooperation with C. J. King, superintendent of the station, studies of the soil-animal fauna were undertaken in the plots in which root rot had been controlled and also in check plots. The manuring experiment was started in 1921. Faunal studies were quantitative, sampling being accomplished with a modified peat sampler. Organisms were extracted from the soil by means of Berlese funnels. A total of 58 samples from unmanured areas and 54 samples from manured areas were taken, and a total of 14,570 organisms, predominantly arthropods, were obtained from them. The results of studies made are summarized as follows:

Classification	Population densities per acre in 0-12 inch soil layers		Ratio of increase in--		Percentage of total
	Unmanured plots	Manured plots	Unmanured plots	Manured plots	
	Millions	Millions			
Nematodes[1/] ---	0.01	0.18	1	18.0	0.1
Earthworms-----	.60	1.24	1	2.0	1.4
Pauropoda-----	.14	.67	1	4.8	.6
Araneida------	.09	.18	1	2.0	.2
Acarina-------	23.63	27.07	1	1.1	38.8
Collembola----	20.60	39.30	1	1.9	45.8
Thysanura-----	3.31	3.86	1	1.2	5.5
Thysanoptera--	.20	.14	1	0.7	.3
Hemiptera-----	.37	.55	1	1.5	.7
Coleoptera----	1.07	1.64	1	1.5	2.1
Hymenoptera---	.30	.43	1	1.4	.6
Diptera-------	.06	.06	1	1.0	.1
Insect larvae-	1.80	3.00	1	1.7	3.7
Miscellaneous insects----	.10	.21	1	2.1	.2
Total------	52.28	78.53	--	--	100.0
Average----	--	--	1	1.5	--

[1/] Only larger, presumably parasitic nemas were counted.

The effect of manuring was to increase the numbers of soil animals present. The numbers of cotton-root-feeding species were stimulated, along with saprophytic and mycetophagous types. No qualitative effect of manuring on the fauna was noted. Accompanying the increase in numbers of soil animals, the following modifications of biotic, chemical, and physical properties of the soil were noted: (1) An increase in organic matter content; (2) an improvement in soil structure (as shown by volume weights and soil-resistance changes); and (3) an increase in the population densities of microfloral components, namely, coccoid bacteria, rod-shaped bacteria, linear actinomycetes, phycomycetes, ascomycetes, and undetermined fungi (as shown by evolution of CO_2 and the Cholodny method). No significant differences in soil pH values were noted. It is believed that the factors most likely responsible for increasing the densities of soil animals are (1) an increase in food supply (organic matter, live roots, decaying roots, and fungi) and (2) improved soil structure which, in effect, amounts to a spatial increase in the soil environment. Data indicate that the control of the cotton root rot fungus was achieved independently of the numbers of soil animals present. Similar studies in plots manured only 2 years show that control of root rot by manuring precedes quantitative modification of the soil-animal fauna which results from manuring.

Insects and crazy-top of cotton.--T. P. Cassidy and L. D. Christenson report observations on crazy-top, a type of growth abnormality of cotton plants peculiar to certain parts of Arizona. Careful studies by C. J. King, Bureau of Plant Industry, at Sacaton, Ariz., have shown that crazy-top results from water stress and certain soil conditions. It has been noted that there are certain similarities in the structure of crazy-top plants in Arizona and growth abnormalities produced elsewhere by certain insects, notably cotton thrips, tarnished plant bugs, and cotton flea hoppers. In cage and field tests during the past summer none of these insects produced growth abnormalities that could be confused with crazy-top. Large populations of tarnished plant bugs and cotton flea hoppers in the field also failed to produce crazy-top. It is considered unlikely that insects are concerned in this physiological disturbance of cotton plants.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Wild cotton eradication.--The wild cotton eradication program in southern Florida was somewhat handicapped during February because of rains. This was especially true at Cape Sable, where work had to be temporarily discontinued, but laborers are now being returned to the camp there to resume work. Inasmuch as the wild cotton grows along the low-lying coastal section and adjacent keys or islands of southern Florida, rains naturally interfere more with this work than with most of our other activities. A good deal of the wild cotton was found to be heavily infested with the pink bollworm in 1932, but practically all of this area has been cleaned one or more times, thus reducing the menace to the main Cotton Belt. No infestation has been found so far this season in the small number of bolls examined. During the month a first clean-up was made on 426½ acres, from which 5,075 mature and 31,354 seedling plants were removed. A recleaning was made on 8,570 acres, from which 1,134 mature, 676,388 seedling, and 16,284 sprout plants were removed. In addition a thorough survey for wild cotton was made on some 35,000 acres. This survey was made possible by the fact that the work is being carried on this year with W. P. A. funds and much larger crews are being used.

Thurberia-plant eradication.--The eradication of Thurberia plants was completed in the Tortillita Mountains of southern Arizona on February 14. A total of 59,283 plants were removed from the 64,680 acres covered. Many of the plants are infested with the Thurberia weevil. The eradication is being carried on to remove the menace to cultivated cotton, and, as the Tortillitas are nearest the farming areas, this range was worked first. The Santa Catalinas are next and work was immediately begun on that range. It is considerably rougher than the Tortillitas, but thus far no unusual difficulties have been encountered. By the end of the month 3,080 acres had been covered, from which 33,863 plants had been removed. This work is being carried on with W. P. A. funds.

Trap-plot cotton in the Big Bend.--Plans for trap plots of cotton in the Big Bend area of Texas for the coming season have just about been completed. This is one of the special control measures begun several years ago to reduce the pink bollworm infestation in this area and thereby lessen the spread to other areas. The other measures in the program are delayed planting of the cotton crop and the clean-up of fields after the picking season is completed. It has been determined that the peak of moth emergence in the Big Bend is completed by the latter part of May. No cotton is planted before April 15, therefore there are no blooms before the middle of June. Small plots of cotton are planted as early as possible to attract the moths emerging later in the season. The farmers prepare the land and plant and cultivate the plots, and the inspectors of this project pick all of the blooms daily. Tentative plans call for 12 plots, ranging in size from 1/2 to 1 acre. These plots are well distributed throughout the area. The land has already been prepared, and planting will be done about the middle of March. It will thus be seen that the trap plots will begin fruiting about 1 month in advance of the main crop.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Insecticide tests against Mexican bean beetle in Ohio.--N. F. Howard and his associates at the Columbus, Ohio, laboratory, report the following conclusions from insecticide tests against the Mexican bean beetle in Ohio during 1935. Satisfactory control was obtained with suspensions of derris root powder and cube root powder in water at dilutions of 0.01, 0.015, 0.02, and 0.025 percent of rotenone. Fairly satisfactory results were obtained with derris sprays containing 0.005 percent of rotenone. The incorporation of various wetting agents, spreaders, and stickers did not improve the efficiency of these spray suspensions. In general, cube proved to be approximately equal in effectiveness to derris when tested at the same dilution of rotenone. Derris dust mixtures and cube dust mixtures containing 0.4, 0.5, and 0.75 percent of rotenone, respectively, with various diluents, all gave satisfactory control. As a result of special tests of various diluents, it was concluded that it was not important to obtain any particular diluent for use with derris or cube dust, provided such diluent was nonalkaline in character. The results indicated that talc-flotation sulphur (50-50), wheat flour, ground marc, talc, bentonite, and finely ground dusting sulphur in the order named, with the last two almost equal in effectiveness, were as good as , or slightly superior to, any of the diluents tested. In general, derris dusts appeared to be slightly superior to cube dusts in effectiveness. In the tests with cryolite sprays it was necessary to use 3 pounds of cryolite to 50 gallons of water in order to obtain satisfactory control in severe infestations. In general, the cryolite sprays (natural or synthetic) proved to be about equal in effectiveness to derris sprays containing 0.01 percent rotenone, but not equal to derris sprays containing 0.015 percent rotenone. The cryolite dust mixtures did not prove to be equal to the derris or cube dust mixtures for bean beetle control. In a limited number of experiments, the ground root of devil's-shoestrings (Cracca virginiana L.) at a dilution of 0.01 percent rotenone, gave approximately equal results to those obtained with derris root powder sprays containing the same proportion of rotenone. Cracca root dust mixtures containing 0.39 and 0.4 percent rotenone, respectively, gave satisfactory control and were approximately equal to derris dust mixtures of the same rotenone content. In tests with phenothiazine, 2 pounds of this material in 50 gallons of water gave very satisfactory control, but in most instances it was not equal to derris containing 0.015 percent rotenone. Dilutions of 1 pound of phenothiazine in 50 gallons of water gave only fair control in severe infestations. Phenoothiazine diluted with talc 1-5 gave fairly satisfactory control in the one experiment where it was tested, but in no case did the phenothiazine-talc mixtures give as satisfactory control as derris or cube root dust mixtures containing more than 0.1 percent rotenone.

Salt flotation effective in separating weevil-infested seed peas.--T. A. Brindley, of the Moscow, Idaho, laboratory, in continuing his observations upon the efficiency of salt flotation in the separation of weevil-infested peas from sound peas, reports that examinations of approximately 160,000 peas that had been subjected to a new commercial salt-flotation process disclosed that only 101 of the treated peas contained the pea weevil (Bruchus pisorum L.) and that all of the weevils in these peas were dead. With one exception, the dead weevils were very small. The original weevil infestations in the peas contained in the lots examined ranged from 0.4 to 16.7 percent, with an average of 2.75 percent.

Effectiveness of naphthalene as a soil fumigant for wireworms varies with soil type.--R. S. Lehman, of the Walla Walla, Wash., laboratory, reports that recent laboratory experiments with pure naphthalene as a fumigant against the sugar beet wireworm (Limonius californicus Mann) in three types of soil, i. e., loam, sandy loam, and silt loam, have shown that mortalities were consistently lower in these types of soil in the order given. According to information obtained thus far, moisture does not appear to exert any significant effect on the efficiency of the naphthalene as a fumigant in the loam soil and probably only a slight effect in the sandy loam soils.

Wireworm damage to potatoes in Washington varies with time of planting and soil-moisture content.--K. E. Gibson, Walla Walla, reports that investigations of wireworm damage to potatoes at Walla Walla in 1935 demonstrated that potatoes planted on June 28 and harvested on October 25 showed less wireworm damage than those planted on March 19 and harvested on August 22 in the presence of approximately equivalent wireworm populations for both plantings. Also, these investigations showed that damage was less to potatoes in nonirrigated than in normally irrigated plots exposed to approximately the same wireworm populations.

Fluorine compounds effective against corn earworms on lima beans.--According to a report submitted by L. W. Brannon, of the Norfolk, Va., laboratory, the results of a field experiment in 1935 to determine the relative effectiveness of various dusts and sprays in controlling the corn earworm (*Heliothis obsoleta* Fab.) on lima beans on the Eastern Shore of Virginia, showed that synthetic cryolite, 60 parts, with talc 40 parts by weight, commercial barium fluosilicate undiluted, and commercial barium fluosilicate diluted at the rate of 80 parts by weight with 20 parts of wheat flour, gave the best control of any of the insecticides tested, as indicated by the increase in the average number of pods per plant over the untreated plots and by the reduction in the number of wormy pods per plant. No significant control was obtained with derris-talc dusts, with rotenone contents of 0.75 and 1.0 percent, respectively. Of the sprays used in the experiment, synthetic cryolite at the rate of 3 pounds to 50 gallons of water gave the best control of the corn earworm, the results being usually superior to those obtained with barium fluosilicate used at the rate of 5 pounds in 50 gallons of water. Negative results were obtained with water suspensions of ground derris root and ground cube root (containing 0.025 percent of rotenone). In general, the dusts were greatly superior to the sprays. It is planned to repeat these experiments in 1936 to determine whether harmful quantities of fluorine are present on the market product.

INSECTS AFFECTING MAN AND ANIMALS

Longevity of brown winter tick.--Continued observations by O. G. Babcock, Sonora, Tex., on various lots of seed ticks of *Dermacentor nigrolineatus* Pack. show that all specimens are still alive after a period of 233 days without food.

Ground devil's-shoestrings gives promise as a tickicide.--Mr. Babcock in some preliminary tests with *Cracca virginiana* has found that all *D. nigrolineatus* infesting a horse were killed on the third day after the animal had been treated once. All but one of a number of ticks of this species placed in a box containing the powdered material were killed in 31 hours.

Corn-cob oil effective against lice.--R. W. Wells, Ames, Iowa, reports that a mixture of Tripoli earth and 5-percent corn-cob oil by weight was highly efficient against nymphs and adults of the short-nosed ox louse (*Haematopinus eurysternus* Nitz.) but was not effective against the eggs.

Hibernation of screw worm fly Cochliomyia americana Cushing and Patton.--E. W. Laake, in charge of the screw worm research laboratory at Valdosta, Ga., reports that under winter conditions at Gainesville, Fla., "larvae that have dropped from a carcass and entered the soil may take as long as 67 days to complete their development and emerge as adults, and that pupae buried under 2, 4, and 6 inches of soil may continue development under adverse conditions for as long as 54 days and still emerge as adults."

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Thirteen living larvae of the Mediterranean fruit fly (Ceratitis capitata Wied.) were intercepted at San Juan, P. R., on November 8, 1935, in oranges in stores from the Canary Islands. Larvae, pupae, and adults of the West Indian sweetpotato weevil (Euscepes batatae Waterh.) were taken at Philadelphia on December 9, 1935, in sweetpotatoes in stores from Ecuador. This is our first record of this weevil being intercepted from Ecuador. The scale insect Fiorinia juniperi Leon. arrived at Seattle, Wash., on June 4, 1935, on Japanese yew (Taxus cuspidata) plants in ship's furnishings from Japan. Living and dead larvae, pupae, and adults of Bruchus tristis Boh. were intercepted at New York on November 23, 1935, in seeds of Pisum sativum in the mail from Italy. The larvae and pupae of this bruchid are new to the National Museum collection. An adult of the scarabaeid Epicometis hirta Poda was taken at Buffalo, N. Y., on December 19, 1935, in a dried blossom of Opuntia sp. in the mail from Italy. Living specimens of Liothrips vaneeckei Pr. arrived at New Orleans on June 5, 1935, in and on lily roots in stores from Japan. J. R. Watson, of Gainesville, Fla., states that this is the first record of this thrips from Japan. An adult of the coreid Cebrenis centrolineata Westw. was intercepted at the airport at Brownsville, Tex., on December 30, 1935, on a gardenia in cargo from Mexico. Bruchophagus gibbus Boh. was taken at Washington, D. C., on November 15-22, 1935, with seeds of Elymus, Ephedra, Melica, Melilotus, and Poa in the express from Mongolia. A. B. Gahan reports that this eurytomid is probably phytophagous. Living specimens of Thrips fuscipennis forma corticina Pr. arrived at Baltimore on September 26, 1935, on cuttings and leaves of pine in the mail from Germany. A living specimen of the bean pod borer (Maruca testulalis Geyer) was intercepted at San Francisco on January 3 on flower leis (Dioclea violacea) in baggage from Hawaii. A living specimen of the lygaeid Lygaeus teapensis Dist. arrived at Galveston, Tex., on November 26, 1935, with banana debris in cargo from Mexico. A living adult of the weevil Orchidophilus aterrimus Waterh. was intercepted at Honolulu, Hawaii, on October 21, 1935, among the roots of an orchid, Grammatophyllum multiflorum, in baggage from the Philippines. According to L. L. Buchanan, the species aterrimus Waterh. has been taken from the genus Acythopeus and placed in the genus Orchidophilus.

Pathological interceptions of interest.--Small spots on pods of peas from Cuba intercepted at New York on February 24 were filled with bacteria. The symptoms did not fit those of Bacterium pisi (Sack.) E. F. S. or other bacterial pathogens known to attack peas. Secondary bacteria often multiply under transit conditions, therefore the status of this material is uncertain. Citrus canker (Bacterium citri (Hasse) Jehle) was intercepted at Baltimore on February 24 in a navel orange from Japan. Our first interception of Cercospora hibisci Tr. and Earle was made at Tampa on January 15 on okra from Cuba. Our first interception on the genus Eurya was made at Seattle on February 4, Colletotrichum sp. on E. japonica from Holland. Our first interception of Cylindrosporium brassicae Fautr. and Roum. was made at Philadelphia on February 20 on petsai cabbage from Japan. Gloeosporium concentricum (Grev.) B. and Br. was intercepted from Belgium for the first time on February 16 at Philadelphia on cabbage. Glomerella cingulata (Ston.)

Spauld. and Schrenk was intercepted on Aucuba leaves from Italy on October 31, 1935, at New York. The only previous interception of the disease on Aucuba was made in 1916. Godronia cassandrae Peck was intercepted from Estonia for the first time on January 10 at New York in a large shipment of cranberries. Our first interception of a mildew on Billbergia is Oidium sp. on B. speciosa from Japan taken at Boston on January 31. Phytophthora sp. was intercepted on lily bulbs from Holland on February 13 at New York. Phytophthora sp. was intercepted on two lots of eggplant from Cuba on January 28 at New Orleans. A similar interception was made in 1931. British Guiana has been added to the list of countries from which Sclerotium oryzae Catt. has been intercepted. The interception was made at New York on January 24 in rice straw. Septobasidium pseudopedicellatum Burt was intercepted on January 3 at Miami on tangerines in baggage from Cuba. Thecopsora padi (K. & S.) Grove was intercepted from Sweden for the first time on February 17 at New York on cones of Picea abies. The rust was heavily parasitized by Darluca filum (Biv.) Cast. Uredo sp. was found on a leaf of Laurus sp. cuttings from the Azores intercepted at Boston on February 13. We have no previous interception record of a rust on this host.

Mal secco disease of lemons.--A serious disease of lemons in parts of Italy called "mal secco" disease is at times reported as affecting the fruit. Careful inspection of shipments arriving in this country, including culturing of material submitted by inspectors as doubtful, has failed to disclose any evidence of the disease organism Deuterophoma tracheiphila Petri.

Interceptions continue to increase.--Pest interceptions as recorded in Washington continue to increase, the totals for the calendar year 1935 being 56,199, as compared with 35,750 for 1934. January 1936 set a new all-time high of 6,540 interceptions for 1 month.

DOMESTIC PLANT QUARANTINES

Pussy willow interceptions unusually numerous.--Sixty-two shipments of pussy willow cuttings consigned from points in the satin moth infested area of the western half of Washington State were intercepted during the first 6 weeks of the year. The greatly increased number of such interceptions over previous years is probably due to a recent reorganization of transit inspection schedules at Pacific Northwest points by M. E. Connolly. Nearly all these violations were intercepted at the stations of Seattle and Spokane. With the exception of two, the shipments were noncommercial and, on being notified of the quarantine restrictions, consignors expressed a willingness to cooperate in the Department's pest-control activities.

Office space provided for Pittsburgh inspector.--Office quarters have recently been obtained for the Pittsburgh inspector, K. S. Rohwer, whose address is 438-L, Central Post Office Building. Pittsburgh is situated on the boundary line of the area regulated under the Japanese beetle quarantine and the number of violations found at this strategic transfer terminal indicates the importance of this station as a year-round transit-inspection point. Eighteen shipments were intercepted there in January, placing the station second only to Boston in the number of violations found in the month.

Phony peach disease inspection begins.--Plans have been completed for an extensive campaign of inspection for the phony peach disease in the peach-growing areas of the 13 infected States, and for a complete survey of about 9 States where the disease is not known to exist. The work will require the services of approximately 100 Federal and State inspectors. For the past several weeks the W. P. A. labor available for the control of this disease has been concentrated on the destruction of escaped peach trees which grow in large numbers in wooded areas and along fences and terraces in the infected States. Beginning when the trees are in bloom in the extreme South and working northward as the season advances, the work of finding and destroying trees while they are easily distinguished is accomplished with a high degree of efficiency. Nearly 6¼ million of such escaped trees have been destroyed by the relief workers over the period from early in August to February 15, as compared with over 2½ million abandoned trees.

Interesting interceptions.--Of the 277 violations of Federal plant quarantines intercepted by transit inspectors since the first of the year, the following are of special interest: Several shipments of uncertified lumber and of old empty cable reels from the gypsy moth area, reported seen by Inspectors Burns and Sawyer, of Boston; combination shipments of Oregon grape and pussy willow, in violation of two Federal quarantines, seen at Omaha by N. H. Dunlap, and at Spokane by M. E. Connolly; and a freight shipment of bulbs in pottery bowls covered with green rooted moss, and a small quantity of soil, from the Japanese beetle area, without the beetle certificate, intercepted at Indianapolis by William R. Walton. A shipment of currant and gooseberry plants in a bundle of old newspapers, mailed from England with no return address and moving in apparent violation of the foreign quarantine relating to white pine blister rust, was also seen at Omaha by Mr. Dunlap, who referred it to the responsible port inspector.

Pine-nursery inspections start early.--Applications for permits to ship five-leafed pines interstate from blister rust infected States under the provisions of Federal quarantine No. 63 are coming in and special arrangements are being made this year to make inspection for Ribes in the sanitation zones early in the season, before competing vegetation obscures such plants, since Ribes leaves normally appear from 1 to 3 weeks in advance of most other native wild plants. Timely eradication, which should be completed prior to May 31, will result in more efficient and less expensive protection.

Another Texas County inspected for citrus canker.--Following the discovery in December 1935 of citrus canker in Jefferson County, Tex., attention was directed to Orange County, bordering on the north. The recent inspection of stock in two nurseries and of 35,000 abandoned and dooryard trees has thus far disclosed no canker in the county. The work of the W. P. A. crews in removing 1½ million nonproducing citrus trees from the

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Galveston-Houston-Beaumont area, including the two above-named counties, in recent months, is a vital factor in the fight to eradicate this disease from the country.

INSECTICIDE INVESTIGATIONS

A new nicotine insecticide.--The search for new nicotine insecticides in which the nicotine is fixed in water-insoluble form has resulted in a product called nicotine peat. As the name indicates, it is a combination of nicotine and peat, the latter being an organic acidic type of soil. It can be used as a dust or in a spray. About a dozen different types of peat have been examined for nicotine-combining power, the best of these being German moss, which produces a product having 9.7 percent nicotine. However, by pre-treatment of the peat with hydrochloric acid the nicotine content can be raised. Thus there has been made from New Jersey peat a 12.3 percent product, which represents the highest content of nicotine thus far attained. Tests at a dosage of 5 pounds per 100 gallons show 90 percent of the contained nicotine to be insoluble in water. Efforts are being made to obtain a supply of this material for field tests to be made this season on apple trees for codling moth control. An article by L. N. Markwood, of this Division, containing more detailed information, is soon to appear in Industrial and Engineering Chemistry.

Does nicotine occur in tobacco as a glucoside?--An Italian, N. A. Barbieri, in 1928 described the isolation of a nicotine compound called "tabacin" from tobacco and referred to it as the toxic principle of tobacco, leading one to believe that nicotine occurred principally in this form. Tabacin was found to be a glucoside of nicotine containing in addition to nicotine some nitrogen which on treatment with acids or alkalies formed ammonia. A Japanese, Yamafuji, in 1932, apparently unfamiliar with the work of Barbieri, found two glucosides of nicotine. One of these, tabacinin, occurred to the extent of 0.01 to 0.03 percent, and the other, tabacilin, was present to 0.4 to 0.5 percent. Tabacilin seems to correspond approximately with Barbieri's tabacin, but Yamafuji does not mention the formation of ammonia from either of his glucosides. Tabacilin dissolves easily in alcohol, whereas tabacin dissolves only in hot alcohol and usually separates on cooling. An attempt has been made by C. R. Smith, of this Division, to prepare the glucoside tabacin or tabacilin, but after several months' of study of both nonfermented and partly cured tobacco, it appears that no glucoside is present in the species of Texas Cuban tobacco used by him. It is possible that certain varieties of tobacco might yet be found to contain a glucoside of nicotine, although the prospect does not seem promising. It is planned to test other tobaccos by a procedure recently adopted as indicating the presence of possible glucosides. So far, it would appear that nicotine occurs in tobacco only as salts of malic, citric, oxalic, and other organic acids.

Eastern apple-washing studies completed.--Cooperative apple-washing experiments were resumed at Washington, D. C., during the fall of 1935. The fruit for these experiments was obtained by M. H. Haller, of the Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, from the experimental plot of the Division of Fruit Insect Investigations, Bureau of Entomology and Plant Quarantine, at Martinsburg, W. Va., and washed at the University of Maryland, College Park, Md., in the washing machines of the Horticultural Department. The fruit was then stored at 30° F. until wanted for analysis. The only insecticide used was lead arsenate. Duplicate lead determinations were run in all cases, using 30 fruits for the unwashed and 15 fruits for the washed lots. In all, 947 analyses were made during the season. The total spray residue ranged from 0.08 to 0.23 grain of lead per pound of fruit. Of the 41 washing treatments used, only 4 were effective in removing the lead residue to the tolerance in all spray plots. The two best single washes were (1) 1-1/2 percent hydrochloric acid + 1 percent Vatsol at 100° F., and (2) 1-1/2 percent hydrochloric acid + 1 percent mineral oils at 110°. The other two effective treatments spoken of consisted of double washing, using 1-1/2 percent hydrochloric acid at 110° and 80 pounds sodium silicate per 100 gallons water at 110° in this and the reverse order.

Dispersion of chemicals through trees studied.--A study of the distribution of chemicals injected into trees as preservatives and protection against bark beetle has been undertaken by the Division of Insecticide Investigations in cooperation with the Division of Forest Insect Investigations. Groups, each consisting of five trees of Southern short leaf pine, were injected with two different dosages of each of five chemicals; i. e., copper sulphate, sodium arsenite, zinc chloride, mercuric chloride, and sodium fluoride. Cross sections at five different heights above the ground were taken and divided into six concentric rings of equal width, making a total of thirty samples representing each tree. These samples are being analyzed for their percentage content of the chemical injected.

Color test for rotenone improved.--L. D. Goodhue has described in the Journal of the Association of Official Agricultural Chemists, volume 19, number 1, pages 118-120 (February 1936), an improvement in a previously published colorimetric method for the determination of small quantities of rotenone. The test has been made more delicate and more stable. It is suitable for the analysis of small samples of rotenone-bearing roots, for the analysis of spray residues of derris and cube, and for following the photochemical decomposition of rotenone. The test is made on acetone solutions adjusted to contain between 5 and 250 micrograms of rotenone per cc.

Another index of mothproofing materials now available. R. C. Roark and Mrs. R. L. Busbey have continued their compilation of the patents relating to the mothproofing of fabrics and other materials, and "A Third Index of Patented Mothproofing Materials" was issued in February as a 104-page mimeographed publication of the Bureau.

BEE CULTURE

Cooperative studies in supersedure.--The supersedure project already under way and the proposed project on disease resistance have caused beekeepers in various States to express increased desire to join their forces with those of the Federal Government in attacking beekeeping problems on a cooperative basis. Memoranda dealing with the supersedure project are under consideration with the Iowa State Experiment Station and the Kansas State Experiment Station. Each of these institutions will furnish equipment and will arrange for taking the necessary records on queen bees of known history, and supplied by this Division. The cooperating institutions will also be supplied with package bees for use in this work. Queen rearers and package-bee producers in the South, as well as commercial honey producers in the North, are cooperating with Federal agencies to further this project. Queen rearers are permitting their operations to be checked so that data will be available as to the conditions under which queens used in the work were reared. This data should indicate whether or not these conditions play a part in supersedure. The cooperating honey producers in the North are giving the use of colonies and equipment for the installation of packages and the introduction of queens under both normal and experimental conditions, as well as permitting adequate checks and records to be made from time to time.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

A species of Scarabaeidae from an ant nest.--Three mature larvae associated with a newly transformed adult of the scarabaeid *Serica lecontei* Dawson, all taken from the nest of an ant, *Formica exsectoides* Forel, at Fairland, Md., by Elizabeth Haviland on November 25, 1935, were recently submitted for identification. A. G. Boving reports that the larva of *S. lecontei* has not previously been known and represents a remarkable intermediate type between other known *Serica* larvae and the usual larvae of *Melolontha*.

Tabanus pygmaeus Will. in Delaware.--Included in material submitted for determination by Donald McCreary was a single specimen collected by him at Nassau, Del., on June 11, 1935, which Alan Stone has identified as belonging to this rare and interesting species. *T. pygmaeus* has previously been reported from Florida only and has been taken infrequently, no specimens having been in the collections of the National Museum. It superficially resembles *T. pumilus* Macq. and *T. sparus* Whitn., but differs markedly in several structural features.

An interesting new aphid from California.--Specimens of aphids taken on leaves of *Cocculus laurifolius* at Niles, Calif., on December 28, 1935, and submitted by H. H. Keifer, of the California State Department of Agriculture, have been identified by P. W. Mason as *Thoracaphis* sp. No species of this genus seems to have been recorded from America up to this time, the group having apparently been confined to the Orient. Several species have been described from Japan, Formosa, China, and Java, but none from the host mentioned.

INSECT PEST SURVEY AND INFORMATION

Survey starts new season.--The March 1 number of the Survey Bulletin opened Volume 16. It is especially desired that contributions of survey data be received from the field workers of the Bureau. Notes on the abundance or scarcity of any insect, the extent of damage being done, the abundance of parasites or predators, and the effect of soil, climatic conditions, or other factors on abundance, are very valuable in the aggregate, although apparently of little significance to the individual observer. Reports from the Bureau's workers should be among the most frequent and valuable made to the Survey.

Phyllophaga adults desired.--We are particularly anxious to receive collections of Phyllophaga adults, as a cooperative project on these insects is now being carried on by several divisions of the Bureau. Each evening's collection should be tied separately in cheesecloth and all should be kept in 70-percent alcohol for 1 week. Material can then be removed from alcohol and shipped damp. If material is collected while the insects are feeding, the material from each kind of plant should be kept separate.

JAPANESE BEETLE CONTROL

Nursery shipments at standstill.--Extremely cold weather, frozen ground covered with snow, and icy roads caused delay in the shipment of nursery stock and hampered the activities of inspectors throughout the entire Japanese beetle regulated area.

Exhibitors informed of certification requirements at National Flower Show.--Communications were addressed to all growers expecting to exhibit at the National Flower Show to be held in Baltimore from March 14 to 21, informing them of the procedure to be followed if they desired to remove their plants to nonregulated points at the conclusion of the show. Thus forewarned, exhibitors from nonregulated territory or dealers contracting for delivery of their stock to outside points will be enabled to obtain certification for stock produced under the prescribed safeguards.

Preparations for spring activities.--The treating division has completed the overhauling of soil-sampling equipment and the construction of new carbon disulphide injectors. Everything is in readiness to gather samples of lead-arsenate-treated nursery plots as soon as soil conditions will permit. A representative of the Bureau of Agricultural Engineering has made a number of improvements in the bean-debeetling machines. Some of the machines are being motorized to speed the inspection of large quantities of beans.

Beetle collected with male and female legs.--Examination of the genitalia was necessary to determine the sex of a single adult Japanese beetle collected while an inspector was scouting the premises of a wholesale cut-flower dealer in Baltimore. Usually the sex of an adult may be determined by the structure of the tibial spur of the first pair of legs. In this specimen, however, the right tibial spur is elongated as in the female and the left spur is pointed as in the male. An examination of the genitalia showed the specimen to be a female.

Adult beetles in greenhouses.--During cloudy weather and with the outside temperature at 15° F., employees from the Philadelphia office collected over 100 adult Japanese beetles in a range of greenhouses at Yardley, Pa.

Gypsy moth inspector accompanies work train.--During the month the district inspector at Framingham, Mass., spent a day on a Boston & Maine Railroad work train, looking over car-rail stands where spare rails are stored along the railroad right-of-way. Conditions of gypsy moth infestation in the neighborhood of these stands were determined. Each year these old scrap rails are collected and shipped to points outside the gypsy moth regulated zone. No infestation was found near any rail piles examined.

Midwinter shipment of spruce trees.--On February 1, 12,600 spruce trees ranging from 6 to 8 feet in height were certified for shipment from Claremont, N. H., to Richmond, Va. These trees were dug from the forest just prior to the freezing of the ground, at which time they were assembled and inspected. At the time of inspection it was expected that some of the trees would be shipped to southern points outside the Japanese beetle regulated territory, therefore the roots were washed and packed in sphagnum moss.

Gypsy moth road stations continued throughout winter.--Severe weather conditions greatly reduced vehicular travel through the gypsy moth road stations in western Massachusetts and Connecticut. Stations were operated at all times, except when the halting of cars involved serious accident hazard because of icy roads.

Paving blocks certified from Massachusetts quarry.--Five carloads of granite paving blocks were shipped to Troy, N. Y., in mid-February from a quarry in eastern Massachusetts. Although the snow was several feet deep, the inspector was able to certify the shipment because the blocks were piled away from tree growth and the surrounding bushes had been kept cut.

Elm sanitation progresses in Westchester County.--Sanitation work in upper Westchester County, N. Y., is progressing rapidly. On February 24 only 21 areas out of a total of 131 remained to be assigned to field workers. These areas have a population of only about 17,000 dead and dying elms. In lower Westchester County, 32 out of 74 areas have been assigned to crews.

Supervision of transients.--At the request of the Westchester County Park Commission, the project has furnished supervisors to direct the work of two sanitation crews, comprising a total of 33 men, from the two transient camps at Elmsford, N. Y. These crews are marking and removing dead and dying elms from park property along the Saw Mill River Parkway. The supervisors supplied are skilled W. P. A. workers.

Eradication and sanitation personnel.--At the end of February there were engaged in Dutch elm disease activities 3,096 W. P. A. workers, 882 enrollees from exclusively Dutch elm disease C. C. C. camps, 125 men from other C. C. C. camps, 34 men from transient camps, and 65 personnel on regular Departmental appropriation. State personnel assigned to this work numbered 22 appointed men and 23 per diem workers.

Dutch elm disease infection records.--At the end of the month the known cases of Dutch elm disease totaled 14,240, with 5 confirmed trees still standing. In the sanitation work, 1,078,948 dead and dying trees had been removed and 405,353 trees of this type had been tagged for future removal. Sanitation activities in the areas to be made elm-free accounted for the removal of an additional 264,087 elms.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Moth control in the various States.--Up to March 1, under the W. P. A. projects, the numbers of workers employed under the gypsy moth projects in the different States were as follows: Maine, 176; New Hampshire, 120; Vermont, 731; Massachusetts, 739; Rhode Island, 108; Connecticut, 736; New York, 192; New Jersey, 110; Pennsylvania, 957; total, 3,869. On the same date, under the W. P. A. emergency project, the numbers employed on brown-tail moth work were: Maine, 572; New Hampshire, 575; Vermont, 21; Massachusetts, 568; Rhode Island, 12; and Connecticut, 34; total, 1,782. Under the brown-tail moth project much of the time is being spent in cutting winter webs. However, in 33 towns in Massachusetts, 33 towns in New Hampshire, and 34 towns in Maine all of the webs have been cut and efforts are now being made to cut and remove worthless apple and cherry trees and other favored foods. Up to the last week in February, 633,233 brown-tail moth webs have been cut in Maine, 1,700,224 in New Hampshire, and 459,200 in Massachusetts. One brown-tail moth infestation has been found in Rhode Island, located on a few apple trees in Barrington. This is the first infestation found in Rhode Island since before the removal of the quarantine in July 1922. In February arrangements were completed with the Pennsylvania Department of Forests and Waters whereby some of the buildings at the C. C. C. camps recently abandoned near Avoca, Pa., were made available for the storage of arsenate of lead, spray hose, and other materials purchased for use in connection with the gypsy moth eradication campaign being carried on in that State. This arrangement temporarily relieved our storage situation in Pennsylvania, a situation that is rapidly becoming acute. As this project was, until recently, unable to obtain all W. P. A. workers requisitioned for duty assignments in towns bordering the Connecticut River in Vermont and New Hampshire, it was possible to examine only a little area in lowlands along this river prior to the serious flood that began about the middle of March. It is feared that much infested debris was washed down stream by this flood and may result in many new infestations becoming established in Massachusetts and Connecticut adjacent to the river. Many of the cities and towns in the New England States, where Federal W. P. A. gypsy moth work is being carried on, have furnished storage space, without cost to the Government, for equipment used for transporting to and from work W. P. A. workers who were referred for duty assignments on this project from these towns. This splendid cooperation has been very helpful to this project.

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